



Brownie AUTOMOTIVE ENGINEERING Badges

BADGE SERIES OVERVIEW:

In the Automotive Engineering badge series, Brownies discover how vehicles are designed, engineered, and manufactured.

To earn the Automotive Design badge, Brownies create a specialized vehicle that helps a customer. They consider what their customer wants and needs as they create the design criteria, sketch, and sculpt a model of their vehicle.

To earn the Automotive Engineering badge, Brownies explore the importance of vehicle safety. They collaborate and use the Design Thinking Process to engineer a prototype of an emergency vehicle.

To earn the Automotive Manufacturing badge, Brownies explore assembly lines, 5S, and quality control. They use all they've learned to assemble a set of model vehicles and brainstorm process improvements.

NOTES TO VOLUNTEERS:

Follow the Badge Progression:

The Automotive Engineering badge series has been designed for girls to do each badge in order, building on what they've learned. For these badges, the order is:

- 1 Automotive Design
- 2 Automotive Engineering
- 3 Automotive Manufacturing

Use The Talking Points (But Make Them Your Own): In each session, you'll find suggested talking points under the heading "SAY." Some volunteers, especially new ones, find it helpful to follow the script. Others use the talking points as a guide and deliver the information in their own words. Either way is just fine.

Be Prepared (It's What Girl Scouts Do!): Each meeting includes a "Prepare Ahead" section that includes a materials list and what kind of set-up is required. Read it in advance so you have enough time to gather supplies and enlist help, if needed.

Use Girl Scouts' Three Processes: Girl-led, learning by doing, cooperative learning—these three processes are the key to making sure girls have fun in Girl Scouts and keep coming back.

"Learning by doing" and "cooperative learning" are built into these badges thanks to the hands-on activities. Remember to keep the meetings girl-led so you can help create an experience where girls know they can make choices and have their voices heard.

Leave Time For The Closing Ceremony: If girls are having fun doing an activity, you may be tempted to skip the Closing Ceremony so they can keep going—but the Closing Ceremony is absolutely key to their learning.

Here's why: When girls leave a meeting, they'll remember how much fun it was to do an activity, but they may not realize its relationship to the automotive process. For example, they may not realize that they just learned how engineers test their products—unless you tell them. When you do that, you turn a hands-on activity into a minds-on activity.

That's why the Closing Ceremony is so important. It's where you can connect the dots for girls by:

- Pointing out how they acted as automotive designers, engineers, or manufacturers. (For example: They created an assembly line to build a set of vehicles. They struggled a bit with a challenging activity—but they persisted. Now they know that they can solve hard problems if they keep trying.)

- Reminding girls that they are already automotive designers, engineers, or manufacturers—and that it's fun to solve problems using STEM!
- Letting them know that they have what it takes to continue exploring STEM.

These simple messages can boost girls' confidence and interest in STEM—and end the meeting on an upbeat note!

Tell Your Troop Story: As a Girl Scout leader, you're designing experiences that girls will remember their whole lives. Try to capture those memories with photos or videos. Brownies love remembering all they did, and it's a great way for parents to see how Girl Scouting helps their girls!

And please do share your photos and videos with GSUSA by emailing them to STEM@girlscouts.org (with photo releases if at all possible!).



To Prepare for the Meetings:

Before each meeting, you'll find an Overview, notes to Prepare Ahead, and a Materials List, all specific to that meeting.

Before each meeting, read through the meeting plan and any meeting aids. This will help you get familiar with the flow before each meeting.

Handouts specific to the meetings are listed in the Prepare Ahead section of each meeting under Meeting Aids. In addition, the following handouts are available in the Meeting Aids for every meeting:

- **Brownie Automotive Engineering Badges–Materials List:** Each meeting has its own materials list. However, if you like to do all your supply shopping at one time, use this handout. It includes the materials needed for all three Brownie badges.
- **Brownie Automotive Engineering Badges–Glossary:** This is a list of words introduced in the three Brownie Automotive Engineering badges with definitions.
- **Think, Pair, Share:** These facilitation tips will help you to make sure that every girl's voice is heard during brainstorming activities.

Go over words and careers girls can learn about. In the Prepare Ahead section for each meeting, you'll see a list of words and careers girls may or may not know and how to define them. You can find a full list of vocabulary and careers for the badge series in the **Brownie Automotive Engineering Badges–Glossary**.

Gather materials for the badge activities.

Before each meeting, gather materials for the meeting's activities. Review the materials list to see what you already have or if there are items you can ask girls to bring. If your meeting location doesn't have a flag, bring a small one that you can take turns holding or hang in the room.

Each meeting includes its own materials list. However, if you like to do all your supply shopping at one time, use the **Brownie Automotive Engineering Badges–Materials List**. It includes the materials needed for all three Automotive Engineering badges.

Automotive Engineering

BADGE BREAKDOWN

AUTOMOTIVE DESIGN 1

1. **As Girls Arrive:** Identify the Parts of a Vehicle
2. **Opening Ceremony:** Get Moving with Automotive Design
3. **Step 1:** Explore How People Move From Place to Place
4. **Step 2:** Discover Design Criteria
5. **Step 3:** Choose Your Vehicle's Design Criteria
6. **Closing Ceremony:** The Future of Mobility

- Brownies explore different modes of transportation and mobility.
- They learn about the parts of a vehicle.
- They explore different special purpose vehicles and what they do.
- They role play interviews with customers to find out what their customers want and need.
- They create design criteria for a special purpose vehicle.
- They brainstorm ideas for the future of mobility.

AUTOMOTIVE DESIGN 2

1. **As Girls Arrive:** Team Up to Refine Your Design
2. **Opening Ceremony:** Use Data and Iteration to Make Your Design Better
3. **Step 4:** Sketch a Vehicle to Meet Your Criteria
4. **Step 5:** Sculpt and Share Your Vehicle
5. **Closing Ceremony:** Your Future in Design & Awards

- Brownies finish designing their special purpose vehicles.
- They collaborate to review their design checklists to meet customers' wants and needs.
- They create sketches of the interior and exterior of their special purpose vehicles.
- They sculpt their vehicle designs.
- They share their vehicle designs with the troop.
- At the end of the meeting, they earn the Automotive Design badge.

AUTOMOTIVE ENGINEERING 1

1. **As Girls Arrive:** Emergency!
2. **Opening Ceremony:** Jump Into Automotive Engineering
3. **Step 1:** Learn About Simple Machines in Vehicles
4. **Step 2:** Engineer a Vehicle for Safety Based on Criteria
5. **Closing Ceremony:** Safety Innovations

- Brownies explore how engineers build vehicles that meet a set of criteria.
- They learn about simple and compound machines in vehicles.
- They create an engineering plan for an emergency vehicle based on a given set of criteria.
- They look at vehicle safety features and innovations in automotive engineering.

AUTOMOTIVE ENGINEERING 2

1. **As Girls Arrive:** Choose Materials for Your Vehicle Prototype
2. **Opening Ceremony:** Get in Gear with the Design Thinking Process
3. **Step 3:** Build a Vehicle Prototype
4. **Step 4:** Test and Revise Your Vehicle Prototype
5. **Step 5:** Share Your Vehicle Prototype and Testing Results
6. **Closing Ceremony:** Engineer the Future & Awards

- Brownies collaborate to build and test a prototype of an emergency vehicle.
- They look at the Design Thinking Process.
- They build prototypes of their vehicles.
- They test their prototypes for forward and backward motion and the ability to maneuver an extreme condition.
- They use their testing results to improve the design of their vehicle.
- At the end of the meeting, they earn the Automotive Engineering badge.

AUTOMOTIVE MANUFACTURING 1

1. **As Girls Arrive:** Piece It Together
2. **Opening Ceremony:** Jump Into Automotive Manufacturing
3. **Step 1:** Experience the Manufacturing Process
4. **Step 2:** Learn About the Manufacturing Process
5. **Closing Ceremony:** The Future of Manufacturing

- Brownies begin to explore how manufacturers efficiently assemble vehicles.
- They experience and learn about die pressing.
- They look at the 5S organization system and how it helps with manufacturing.
- They complete a task (stamp out shapes from clay) and then use 5S to organize an assembly line and complete the same task a second time.
- They brainstorm possibilities for the future of automotive manufacturing.

AUTOMOTIVE MANUFACTURING 2

1. **As Girls Arrive:** Hooray for 5S!
2. **Opening Ceremony:** Build in Quality
3. **Step 3:** Plan Your Own Manufacturing Process
4. **Step 4:** Manufacture a Set of Vehicles
5. **Step 5:** Share Your Automotive Manufacturing Process
6. **Closing Ceremony:** How to Use What You've Learned & Awards

- Brownies reverse engineer to create a manufacturing plan to assemble a set of vehicles.
- They follow the steps of 5S to set up an efficient assembly line and build the vehicles.
- They check their vehicles for quality by testing to see if their vehicles roll in a straight line and that all the parts are attached securely.
- They discuss their testing results and brainstorm ways to improve their manufacturing process.
- At the end of the meeting, they earn the Automotive Manufacturing badge.

Badge Series and Meeting Length

- This series of badges has been designed to fit into six 90-minute troop meetings.
- There is no snack time scheduled in these meetings, but you can add 15 minutes of “wiggle room” for snacks or activities that run long.
- The times given for each activity are recommended for troop meetings. However, before each meeting, review the amount of time given for each and decide if you think your troop will need more, less, or the same amount of time to complete them. Feel free to adjust the time for any of the activities as needed.
- Give girls 10- and 5-minute warnings before they need to wrap up the last activity so you'll have time for the Closing Ceremony.

Get Help from Your Family and Friends Network

Your Friends and Family Network can include:

- Girls' parents, aunts, uncles, older siblings, cousins, friends, etc.
- Other volunteers who have offered to help with the meeting.

Ask your Network to help:

- Bring supplies or other materials for the meetings.
- Assist with badge activities.
- Make snacks.

Award Connection

Girls earn three badges:

- Automotive Design
- Automotive Engineering
- Automotive Manufacturing

Note to Volunteers: You can buy the badges from your council shop or the [Girl Scout Shop](#).